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TEDS-M and the Study of Teacher Preparation in Early Reading Instruction: Implications for Teacher Education Policy and Practice

Education Policy Center at Michigan State University,
June 2011 Washington, D.C. Workshop

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Abstract

The 2010 report from the National Research Council on teacher education programs in the United States, *Preparing Teachers: Building Evidence for Sound Policy*, reported that “the empirical evidence on effective teacher preparation [is] nearly nonexistent” (p. 99). The publication later that year of two major studies, one on the preparation of mathematics teachers and the other on teacher preparation in early literacy, marked the first use of nationally representative data to begin to answer important questions concerning teacher preparation in the U.S.

In June 2011, the Education Policy Center (EPC) at Michigan State University convened an audience of scholars and policymakers from across the country to discuss the results of the two studies, *Breaking the Cycle: An International Comparison of U.S. Mathematics Teacher Preparation, Initial Findings from the Teacher Education and Development Study in Mathematics in the United States (U.S. TEDS-M)*, and the *Study of Teacher Preparation in Early Reading Instruction* prepared for the Institute of Education Sciences (IES) by the National Center of Education Evaluation and Regional Assistance. Findings from a third study, the National Council on Teacher Quality’s (NCTQ) report, *No Common Denominators: The Preparation of Elementary Teachers in Mathematics by America’s Education Schools*, were also presented and discussed.

Key points from the presentations and discussion:

- Future teachers in the U.S. have weak training in mathematics and are not prepared to teach the demanding math curriculum we need as a nation, particularly in light of the widespread adoption of the Common Core State Standards in Mathematics. Elementary and middle school teachers scored in the middle of the pack among their international peers on measures of mathematical content and mathematics pedagogy.
- Early childhood pre-service teacher candidates report little to moderate emphasis on the essential components of reading during their preparation coursework, with somewhat more emphasis during their field experiences. A majority of the candidates feel prepared to teach the essential components of reading, even though on average they answered correctly only 57 percent of the questions on a knowledge test of the reading components.
- The composition and quality of mathematics education programs varies significantly from institution to institution, both within and across states and governance models.
- These reports begin to answer fundamental questions about teacher preparation. They also highlight the need for additional analysis of these data sets and further research with nationally representative samples to guide policy decisions at every level – university faculty and boards, state departments of education and legislatures, professional organizations, philanthropic foundations and federal agencies.

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Introduction

On June 13-14, 2011, the Education Policy Center at Michigan State University convened several dozen researchers and policy advocates for presentations on and discussion of two new nationally representative empirical studies of teacher preparation: *Breaking the Cycle: An International Comparison of U.S. Mathematics Teacher Preparation, Initial Findings from the Teacher Education and Development Study in Mathematics (U.S. TEDS-M) in the United States (2010)*, and the *Study of Teacher Preparation in Early Reading Instruction (2010)* prepared for the Institute of Education Sciences (IES) by the National Center of Education Evaluation and Regional Assistance and the Association for Institutional Research (AIR). Findings from a third study, the National Council on Teacher Quality's (NCTQ) 2008 report, *No Common Denominators: The Preparation of Elementary Teachers in Mathematics by America's Education Schools*, were also presented and discussed. A list of web links to the three reports and of other works cited follows this summary.

The 2010 report from the National Research Council, *Preparing Teachers: Building Evidence for Sound Policy*, pointed to a lack of any accurate national data to inform discussions and policy decisions about teacher preparation. The TEDS-M and AIR studies now present nationally representative quantitative research that has implications for teacher education generally and for teacher preparation programs in particular. This two-day meeting enabled participants to explore issues raised by these studies of teacher preparation in mathematics and early literacy and their implications for education policy and practice. The meeting was chaired by the co-directors of the Education Policy Center at Michigan State University, William Schmidt, University Distinguished Professor of measurement and quantitative methods, and Robert Floden, University Distinguished Professor of teacher education, measurement and quantitative methods, educational psychology and educational policy.

The format of Day 1 of the session was as follows: for each of the nationally representative studies, an overview and summary of key findings was followed by two panels, one concerned with the how the study might inform the practice of teacher preparation in the content area, and the other focused on state, federal and institutional policy implications. The presentations and panel discussions were leavened with questions and comments from the assembled invited audience.

On Day 2, three individual presentations on topics closely related to the studies were presented, but without accompanying panel discussions; instead, conversation flowed directly from the presentations. Topics included the balance between mathematics and pedagogy, the value of common standards in language arts and mathematics for teachers, and the challenges facing schools and colleges of education.

Presentation of the TEDS-M Study

Day 1 began with an overview of the TEDS-M study presented by William Schmidt, who directed the U.S. component of the study. The TEDS-M study found that future teachers in the U.S. have weak training in mathematics and are not prepared to teach the demanding mathematics curriculum we need as a nation – particularly in light of the widespread adoption of the Common Core State Standards. Specifically, TEDS-M found that future U.S. middle school mathematics teachers on average have mathematical knowledge related to teaching comparable to peers in countries whose students perform comparably to ours; their knowledge is less than future teachers in high-performing nations, but greater than those in lower-performing nations. Future elementary teachers in the U.S. also performed in the middle of the pack among their peers on measures of mathematical content knowledge and mathematics pedagogy.

In response to a question, Schmidt provided some background on the participation by U.S. institutions. Nearly 3,300 future teachers from over 80 public and private colleges and universities in 39 states were involved. Schmidt indicated it was a challenge to identify the total population of institutions providing teacher preparation in the U.S., as nearly 1,400 institutions offer about 10,000 different preparation programs. Compared to high-achieving countries, in which the ratio of content courses, subject matter pedagogy and general pedagogy is typically 50-30-20, in the U.S. the ratio is closer to 40-30-30.

TEDS-M results showed variation by country in mathematics knowledge scores of aspiring teachers as well as variation within countries. Whereas in Germany the variation was mostly individual, with little variation between institutions, in the U.S. the variation was attributable mostly to institutions, especially to private institutions. Some U.S. preparation programs require half or more of their coursework in mathematics, while others require only 30 percent.

Schmidt pointed out that the bottom quartile of institutions in the U.S. produce over half the future teachers in mathematics. He likened this to a “perfect storm” in preparing teachers, in which students coming through a weak K-12 mathematics curriculum receive a weak preparation for teaching mathematics and then go on to teach the weak U.S. K-12 mathematics curriculum. Schmidt pointed out that the students whose scores made up the U.S. portion of the 2003 TIMSS Grade 8 mathematics results are the nation’s teacher candidates of today. He argued that the U.S. drawing its teachers from the middle of the

distributions is comparable to Singapore or Taiwan drawing from its lowest quartile; the U.S. would have to draw its teachers from the highest performance quartile to be comparable with high-performing nations.

In keeping with the new internationally benchmarked and challenging Common Core State Standards in Mathematics (CCSS-M), Schmidt noted that the CCSS-M may have the potential to break the weak U.S. K-12 mathematics cycle. He called for states to redefine teacher certification policies and standards, and for colleges and universities to examine how such new and challenging state policies and standards are translated into programmatic practices and requirements. Schmidt observed that the U.S. is not much different from high achieving nations in elementary student achievement, and suggested that it may be time for the U.S. to define a core set of standards for teacher preparation programs.

During the general discussion that followed, a member of the audience asked about the sustainability of the findings, pointing out that TIMSS shows scores in Singapore falling and those of the U.S. rising; “is there enough in the data to sustain an argument? Do the trends bear out the findings from TEDS-M?” Another participant noted that the premise of the findings is based in economic concerns for the U.S., yet countries with better models of teacher preparation and induction do not show much connection to economic success. “U.S. productivity is way ahead of these countries already – even if we did make these changes, how much would that help?” Schmidt appealed to democratic and social reasons, in addition to any economic rationale, for an improvement in U.S. mathematics education.

One participant suggested it would be helpful to stratify the TEDS-M teacher data by state, since much education policy takes place at the state level. For example, some states offer K-8 certification, while others offer middle school certification. Schmidt responded that there was not much difference by state, suggesting that middle school certification is not of much value in terms of better prepared teachers. Another participant asked if the mathematics classes about which TEDS-M collected data were taught in the college of education as opposed to the college of arts and sciences; Schmidt responded that they were taught in the mathematics department. At the same time, it was noted that courses identified as calculus nevertheless vary in content across institutions.

Sigrid Blömeke, a presenter later in the conference, observed that the criticism of middle school certification seemed justified based on her experience in Germany, where middle school preparation programs show a lack of results similar to those in the U.S.. She pointed out, however, that in Germany the middle school preparation programs draw from a different candidate pool: candidates in elementary and high school preparation programs tend to come from the upper-middle class, while those for the middle school preparation

programs tend to be more diverse and from a lower class. Given the need for a diverse teaching force, a middle school preparation program may help the U.S. get there.

Another participant observed that Russia performed surprisingly well on the TEDS-M, given TIMSS results similar to those of the U.S.; someone else pointed out that teacher preparation in Russia has undergone a significant change, with lower and upper level teachers training together in mathematics at the tertiary level.

In response to a question about what we can learn from the high performing countries in the study, Schmidt observed that these countries responded to the results of TIMSS with coordinated policy – unlike the U.S., with the exception of the Common Core State Standards. Singapore and Finland, he said, now train mathematics specialists for elementary schools. The difference, in his opinion, is “having the will to make public policy at the national level.” Schmidt reiterated that the U.S. should think about a common teacher preparation curriculum.

Panel presentations on the implications of the TEDS-M study for teacher preparation programs

A panel on practice around mathematics in teacher preparation reacted to the study and its implications for teacher education. Hung-Hsi Wu, professor emeritus of mathematics at the University of California Berkeley, Jeremy Kilpatrick, Regents professor of mathematics education at the University of Georgia, and Jennifer Bay-Williams, professor of mathematics education and chair of the department of middle and secondary education at the University of Louisville, each presented comments.

Hung-Hsi Wu’s basic argument is that teachers cannot teach what they do not know. He pointed to the notable deficiencies of mathematics textbooks, which he said lack definitions, logical reasoning and coherence. He called this kind of mathematics Textbook School Mathematics (TSM). Wu argued that, because we do not teach pre-service teachers School Mathematics (SM) in universities, they are forced to teach their students TSM when they become teachers. Changing teachers’ knowledge of TSM to SM requires a change in culture, including increased collaboration between teachers and mathematicians. “In the Common Core era,” said Wu, “we should not expect every K-6 teacher to know School Math – but an effective way to improve math education in K-6 is to retrain teachers in grades 4-6 by teaching them SM.”

Jeremy Kilpatrick’s comments centered on the questions, “What math is needed, and where do teachers get it?” He said that the results of the TEDS-M suggest that teachers get much of their mathematics knowledge from their K-12 experiences as students, as well as on the job, but that mathematics is also learned in teacher preparation programs. Kilpatrick said there are three ways of looking at mathematics preparation in teacher education: academic mathematics courses; school mathematics as a subcategory of

academic math; and mathematics for teaching. Part of the challenge is the “one size fits all” problem: depending on state requirements for teachers, college math departments often must make courses fit all majors, with the exception of mathematics for elementary teachers and geometry. “We can also look at mathematics from a higher standpoint,” argued Kilpatrick: “100 years ago Felix Klein advocated some glimpse of the whole domain that teachers will work in.” Then there is mathematical knowledge for teaching, because teaching requires a special use of mathematics related to pedagogical content knowledge. Kilpatrick presented two key features of preparation in mathematics for teaching: mathematics in teaching situations, and the task demands teacher make of students. Kilpatrick observed that teachers often lower the task demands of students.

Jennifer Bay-Williams presented contrasting ideas in how students and teachers are prepared in mathematics. When it comes to K-12 mathematics content, she argued, mathematics progresses from concrete to abstract ideas with regular integration of concepts and practice. In contrast, the preparation of mathematics teachers begins with abstract, theoretical perspectives and progresses towards concrete, applied concepts during field experiences. Similarly, the articulation of topics as students learn mathematics progresses from fewer, very specific topics toward more topics in which generalization plays a central role in learning. The preparation of mathematics teachers, on the other hand, begins by providing candidates with general mathematical and pedagogical backgrounds, narrowing as students progress to “focused-on-teaching” mathematics and finally a specific focus on a small number of topics during student teaching. Teacher preparation front-loads content and then follows with practice. Bay-Williams also contrasted the experiences of students with those of teacher candidates in terms of opportunities to learn, the roles of assessment, what each is held accountable for, and the backgrounds of who teaches them.

To develop competent teachers of mathematics for every child at every level, Bay-Williams proposed an increase or shift in emphasis on mathematical topics to a more coherent approach to the treatment of content that connects content, mathematical practices and teaching, and an assessment-driven approach to learning content. More research is needed on the connections between content, pedagogical content knowledge and general pedagogy, and the impact of teacher proficiency in these areas on teaching practice and student learning.

Panel presentations of the implications of the TEDS-M study for policy

The panel on implications of TEDS-M for teacher preparation programs was followed by a panel on policy and certification issues around mathematics in teacher preparation. Janice Poda, strategic initiative director for the education workforce at the Council of Chief State School Officers, David Monk, professor of educational administration

and dean of the college of education at the Pennsylvania State University, and Lou Anna Simon, president of Michigan State University, each offered comments.

Janice Poda picked up where Bay-Williams concluded by noting that the Common Core State Standards for Mathematics (CCSS-M) include standards for both practice and content. Practice #1 in the Standards, she said, is for students to make sense of problems and persevere in solving them; others include constructing viable arguments and criticizing the reasoning of others and attending to precision. Poda said the CCSS-M are a tool to prepare all students to become college and career ready. Poda enumerated several policy levers available to states for the improvement of pre-service teachers, including program approval, teacher education curriculum and standards, licensure, and certification tests – which, she noted, are not currently aligned with the CCSS-M. Other possible policy levers include the recommendations of candidates from TE programs, the renewal of certificates/licenses based on CCSS-M and the new assessments beginning in 2014, the creation of a tiered licensure/certification process, and a system of advancement that is weighted and measured for progress in both pedagogy and content. Poda concluded with two challenging questions: how do we define effective teaching? Should we accredit teacher preparation programs based on the proficiency of their graduates?

In his comments, David Monk chose to look at the implications of the TEDS-M study from an economic perspective. He began with supply side issues, describing teacher candidates as either those who are genuinely and deeply called to the profession or “sojourners” who consider teaching to be something they do for a while before moving on to something else. He noted that those who are genuinely called to the profession are an important resource that should not be neglected as a byproduct of well-intentioned efforts to attract more sojourners. Monk mentioned the powerful selection effects of recruitment, incentives and accountability issues. Policy decisions can have unintended consequences, Monk said, referring to Pennsylvania’s switch to separate preK-4 and grades 4-8 certificates, not realizing that it can be hard to stimulate interest in grades 4-8 certificates.

Demand side issues, said Monk, include optimum levels of production, compensation and rates of return, and the duration and timing of preparation. “Pennsylvania is an exporter of teachers – is that bad?” he asked his audience. “I happen to think that good teaching skills lead to success in all fields of endeavor and that a society does not need to worry about having too many people with good teaching skills.” When it comes to curriculum and design issues, Monk said, “content has become king.” The value of field experiences, he said, suffers from a thin research base, noting that not all experiences are educative. Monk observed that excellent teachers make things look easy and argued that good field experiences need to do more than simply have novices watch excellent teachers in action. Monk suggested that professional development for in-service teachers needs to strike a balance between subject-specific and general pedagogy.

Monk spoke of the need for cleansing mechanisms that remove those who are not developing the needed skills and inclinations during their pre-service programs. He also noted a need for the field to identify and remove teachers in the field who have lost their way and who have become “monsters in the classroom.” He stressed the need to understand more about what leads to dysfunctional performance so that future monsters do not arise. He characterized the research base in the field of education as being “highly differentiated,” where some areas are highly developed but with narrow application, while other areas are more focused on application but are less developed. He spoke of the need to harness emerging technology, and of the accountability difficulties presented by a disdain for input measures and by troublesome outcome measures and how to account for proximate versus distill influences. Monk challenged the field to clarify its expectations and square them with reality, asking, for example, whether it is possible for all students to reach high standards in a short period of time or to expect novice teachers to be change agents.

Lou Anna Simon asserted that improving mathematics preparation is “really about leadership and values.” University presidents, she said, have the bully pulpit and the ability to open doors and build coalitions. The new mission of teacher preparation programs is to produce change agents, not just the mechanics of good teaching. “It’s all about continuous quality improvement,” said Simon. This means university presidents must be change agents at the university level as well: “Departments can work together, but may not choose to do so on their own.” Simon referred to the Collins *Good to Great* framework of leadership: “We need people driven to make tomorrow better than today.” She reminded her audience that administrators are also prepared by universities, as are policy makers. Success stories come down to driven entrepreneurs who want kids to succeed. “We want teachers to feel they have the power and capacity to help kids no matter what – we need to get and model this attitude, too.”

The comments of the panelists were followed by an open discussion. It was observed that a common denominator in the TEDS-M study and the reactions of the panelists to it seemed to be an emphasis on content, content pedagogy, general pedagogy and practical experience in schools. Questions about the cost of teacher preparation were raised, in the sense that colleges of education often have budgets lower than those of high schools: are we getting what we pay for? Are we more efficient? Someone else noted an upward trend in mathematics scores in the U.S. as measured by the National Assessment of Educational Progress and the Programme for International Student Assessment and asked, is teacher preparation responsible for any of this?

Someone responded that progress in the U.S. is probably overstated, but that “we’ve raised the bottom so much, we must be doing something different.” Several people offered partial explanations, including state standards that have increased significantly, a

combination of focus and policy effect, and the possibility that teachers now see the connection between intentionality of practice and student achievement. Many states now have middle school mathematics certificates that are more rigorous; also, high stakes testing may have played a part. Other questions emerged: Was this underutilized capacity, or a shift in teacher preparation? What about the value of education internationally? Does this reflect a shift in the value of education in the U.S.?

It was observed that other high performing nations begin by building the capacity of teachers, then bring in accountability; the U.S. seems to begin with accountability, then sometimes adds capacity-building. The U.S. needs to do something to fix our system and move forward, including more collaboration between teacher preparation and the mathematics departments, such as Michigan State University's new center for math and science education. Some people were hopeful of collaboration across campus, but acknowledged that "other campuses have their own issues," such as concerns over tenure and research.

The discussion shifted to questions about how to deal with political issues, including the movement towards reducing funding for education. Several comments suggested that education reform has lost corporate America as an ally, in part because education is still seen as an organization of entitlements and K-12 education is still seen as part of the problem, not part of the solution. The question was raised again if it would be a good idea to have common standards for teacher preparation, comparable to law schools, or if variance is a good thing. It was suggested that part of the power of TEDS-M is that it helps answer that question because it was a study done by teacher educators for teacher educators, that "through conscious collaboration we can find answers." While it sometimes seems that "teacher education seems like a long fight for the lowest possible standards," the fact that 43 states have adopted the Common Core State Standards for Mathematics suggests there is some political appetite for higher standards, and that governors are increasingly receptive to data.

Schmidt pointed out that the TEDS-M study has not had the traction that TIMSS had on curricular reform. Someone suggested that "the current milieu favors the alternate route to teaching, not improving teacher preparation." Schmidt drew this part of the discussion to a close by observing that "teaching is seen differently from other professions – we believe that anyone can teach. This is not true in Taiwan and other high-performing countries."

Presentation of the AIR Study on Early Literacy Instruction

The major findings of the *Study of Teacher Preparation in Early Reading Instruction* (AIR study) were presented by Joanne Carlisle, professor of educational studies at the University of Michigan. Carlisle used two questions to frame her comments: What have we

learned? What's next? She began by reviewing the context of the study, a congressional mandate in the Reading First legislation for "a measurement of how well students preparing to enter the teaching profession are prepared to teach the essential components of reading instruction." These essential components were defined by the National Reading Panel as phonemic awareness, phonics, fluency, vocabulary and reading comprehension, which were collapsed into three components in the study.

The AIR study used a nationally representative sample of some 2,200 students enrolled in teacher preparation programs that covered early childhood education at 99 colleges and universities across the U.S. The survey gathered data on student perceptions of the emphasis on the essential components of reading and preparedness to teach reading, both in their coursework and in their field experiences, as well as on their knowledge about the key components of reading instruction previously identified.

The study found, in brief summary, that pre-service teachers rated the emphasis on the essential components of reading in their programs somewhere between "little" and "moderate" on a four-point Likert scale (0= no focus, 3= considerable focus); they reported a somewhat greater emphasis in their field experiences than in their coursework. On average, candidates answered correctly 57 percent of the knowledge questions; at the same time, 62 percent of the survey participants felt they were adequately prepared to teach the essential components of reading. Researchers found moderate but significant correlations between the knowledge assessment scores and participant reports of performance on ACT and SAT, but not between results on the knowledge assessment and perception of preparedness or emphasis on the core components in coursework or field experiences. Across institutions, they found similar results for public and private institutions, stronger program focus on the essential components at institutions without graduate programs, and most of the significant differences in program features favoring early childhood programs rather than elementary education programs.

Carlisle went on to discuss several issues that affect interpretations of the study results. One was the high rate at which institutions refused to participate – 44 percent in the first round and 40 percent or more for the two replacement recruitment efforts. Another is the self-represented nature of the data, a choice dictated by limited means and resources on the parts of researchers. Carlisle also pointed out the low reliabilities of the subscales of the knowledge assessment portion of the instrument and a poor understanding of the psychometric characteristics of the knowledge assessment.

Carlisle drew her audience's attention to the "meaning" problem: respondents reported relatively little emphasis on meaning in their coursework or field experiences, yet they feel prepared to teach meaning – more so than alphabetics or fluency. She wondered if this was because pre-service teachers think that little preparation is needed, or that

teaching “meaning” is easy to do. Carlisle also drew from the AIR study the importance of comparing teacher preparation programs. Although the AIR study was not designed for this purpose, other studies, including one by Linda Darling Hammond (2005), have found greater variance between than within groups of teachers from different teacher preparation programs. Studies that examine the characteristics of teacher preparation in reading are badly needed. Carlisle noted that a key problem for such studies is defining appropriate outcomes; she wondered if student achievement would be one. Carlisle closed where she began by stressing the importance of remembering and understanding the context in which the AIR study was conducted and how the context of future studies will differ from it, including more recent policy initiatives such as the Common Core State Standards and the rise of alternative teacher preparation programs such as Teach for America.

Discussion following Carlisle’s presentation included references to other studies. The reading results from the Programme for International Student Assessment (PISA), it was pointed out, showed that the U.S. fared well for students with high rates of books in the home; 4th grade students in the U.S. and Russia have done well on the Progress in International Reading Literacy Study (PIRLS), but not on PISA. Studies of Reading First Michigan have shown that students made gains in reading in 1st grade, but that effects washed out by 3rd grade. These data prompted the question, is there an effort in teacher preparation to figure out what to do with poor-reading students? Carlisle reminded the group that the AIR study investigated perceptions of preparedness, not performance, and that the Reading First legislation had a strong professional development component, suggesting that policymakers saw poor preparation in training as an underlying issue. It was observed that teacher preparation programs resisted Reading First as a policy initiative.

Discussion then turned to issues of field experiences. These vary greatly, reflecting the contexts and constraints of placement sites. These contexts and constraints include exposure to rich settings for literacy and more or less coherence between coursework and field experiences. Someone mentioned studies that have shown that [some mentor teachers are all procedural—what does that mean?], while others provide deep experiences in literacy, and wondered if math field placements may reflect similar variation.

Panel presentations on the implications of the AIR study for teacher preparation

The panel on practice surrounding reading literacy in teacher preparation included Margarita Calderón, professor emeritus at Johns Hopkins University, and Daniel Willingham, professor of psychology at the University of Virginia. Calderón focused her comments on the importance of teaching vocabulary explicitly, particularly to language minority students. Calderón pointed out that 85 percent of English language learners are

middle- and high-school students. Explicit instruction of vocabulary is important because English language learners come to school with a small corpus of words; vocabulary knowledge, argued Calderón, correlates with reading comprehension, which in turn correlates with procedural and content knowledge, and content knowledge correlates with academic success. Thus, it is important to help teachers teach vocabulary within the disciplines of social science, science, mathematics and English Language Arts. She argued that teaching depth of word knowledge using a seven step framework helps all students, not just English language learners. Teachers need to know how to select the vocabulary to teach, not only from texts but also from assessments and teacher explanations. Her research has shown that teachers use and sometimes misuse other vocabulary words in their explanations, compounding the challenges to language learners. English language learners also need help with phrases such as sentence starters and question starters, and in learning and using important transition words and connectors that can allow them to express cause and effect, contrast, addition or comparison, or to give examples. She has found that teachers are often not holding students accountable for vocabulary in their subject areas, which diminishes opportunities for students to grow their vocabulary skills.

Daniel Willingham began his comments by characterizing the premise and the two major findings of the AIR study. The premise was that there are five essential components of reading instruction; the first finding is that participants reported that these core components were not emphasized in their preparation programs, the second that respondents were not well versed in the core components. Willingham argued that the AIR study “is about the application of scientific findings to educational practice. What does such application require? How do we get from science to practice?” Willingham proposed three criteria: reasonable consensus about what scientists know; agreement on what these findings mean for educational practice; and willingness and capacity on the part of education school faculty to communicate the findings and change their practice.

On the first criterion – reasonable consensus about what scientists know about reading instruction – Willingham argued that there may be reasonable consensus about reading instruction in academe, but not in the field. The second criterion is about applied science, which includes a goal; Willingham argued that the goal is fairly clear for reading. As for the third criterion, the willingness and capacity on the part of education faculty to communicate the findings and change their practice, Willingham alluded to Herbert Simon’s observation that the problem with business schools is that the faculty is focused more on basic research than on the training of future practitioners. Similarly, teacher education faculty members are more interested in teaching theory than procedure; moreover, they have a reluctance to prescribe practice. As a result, many teacher educators are unwilling to communicate new science to the field – in this case, on reading instruction.

The discussion that followed the presentations of Calderón and Willingham built upon their comments and expanded to include larger questions about teacher preparation. In response to an example of student reading given by Calderón, one participant observed that the student in the example seemed to reflect even more problems than vocabulary, such as problems with fluency, sentence structure and grammar. Calderón responded that academic vocabulary is the basis of fluency, sentence structure and grammar. This type of formative assessment (asking students to read aloud and think aloud about what they are reading) gives teachers useable knowledge and sensitivity to a child's comprehension of text and learning progression. "What does explicit instruction of vocabulary mean? In one sense it is clear, but it is also deceptive." Many content area teachers are reluctant to spend time teaching vocabulary, but texts in content areas may be too hard for students to read without explicit academic vocabulary instruction. Calderón argued that "you can map [vocabulary] practices in which students gain in biology." Explicit instruction of vocabulary, she argued, leads to gains both in vocabulary and in comprehension. Another participant referred to the Million Word phenomenon, commemorating the coining of the one millionth word in the English language, as a recent milestone to argue "we cannot possibly prepare students sufficiently by direct instruction. What, then, is the role of self-teaching?" Calderón responded with the importance of semantic awareness, of teaching students how to learn vocabulary on their own. Another participant responded that many teachers do not have the tools to be able to do this. Someone else observed that the example of student reading suggested that the student was performing, not reading for meaning; "This makes me wonder about focusing on the 5 components, separating them into bits."

The discussion then broadened to some larger issues confronting field placements and the practice of teacher preparation. Someone in the audience described a study of teacher education students and their field work that indicated that during the first 1/3 of their field placement, the students were appalled at what they were seeing from practicing teachers in classrooms; by the mid-point of their field experience, students indicated they could see why their host teachers acted the way they did; the final 1/3 of their experience seemed to be a repudiation of teacher preparation – "they [teacher educators] don't know what they are talking about." Someone else asserted that 80 percent of placements are made in classrooms with teachers who are poor mentors, asking, "Why don't we provide examples of our best understanding of teaching and learning?" The TEDS-M data suggest that it may be because the bottom quartile of our teacher candidates wind up teaching 50 percent of our students. It was noted that, especially in large institutions, student teaching placement is a huge issue: "we often don't get to pick who the mentor teachers will be." This seems particularly true in urban districts. Placements are also complicated by the fact that "good reading teachers can be bad mathematics teachers, and vice versa."

Presentations of policy issues evoked by the AIR study

The panel on policy and certification issues around reading literacy in teacher preparation was made up of David Coleman, founder and chief executive officer of Student Achievement Partners, LLC, and Karen Wixson, dean of the school of education at the University of North Carolina Greensboro.

David Coleman provided an overview of Student Achievement Partners, which played a part in the development of the Common Core State Standards (CCSS). Coleman said his group has three guiding principles: it accepts no money from publishers; it does not compete for state or district grants through Requests for Proposals; and it does not reserve its rights to intellectual property. Coleman acknowledged the efforts of several meeting participants in the creation of the Common Core State Standards, including Bill Schmidt, Hung-Hsi Wu, Dan Willingham, Cindy Shanahan and Elizabeth Moje. Coleman pointed out several features of the CCSS related to the instruction of reading. One is that the CCSS calls for a balance of informational and literary texts, which Coleman said will allow elementary teachers to regain other subjects they have historically taught, such as history, science, mathematics and art. The CCSS also emphasizes reading comprehension in a more systematic way and at earlier levels; this would mean teaching fewer pre-reading strategies and spending more time reading and re-reading worthwhile texts. Coleman spoke of literacy in the disciplines and “staircases of textual complexity.” For Coleman, “the five component list [identified in the charge to AIR in conducting its study] misses the central role of knowledge.”

Colman said that a possible future project for Student Achievement Partners is to create Open Source courses for teachers around the common core standards. He also called attention to the publisher’s criteria developed for the CCSS that includes recommendations on what publishers should leave out as well as what to include. Finally, Coleman acknowledged English language learners as important partners in the Common Core Standards movement worthy of “an ELL Bill of Rights.”

Karen Wixson began her remarks by noting that “it is significant that we are here talking about teacher education, teacher preparation and teachers.” These key players, she said, were left out of earlier policy discussions that focused on curriculum, standards and assessments. Wixson insisted that the coherence represented by the Common Core State Standards nevertheless “leaves room for individual instantiation.” She pointed to the concept of learning progressions as another CCSS contribution. Wixson agreed with Coleman that the Common Core Standards are much more than the “big five” key components of reading instruction; instead, she said, “they provide an integrated ELA framework of reading, writing and speaking.” The big five are foundational skills for early grades, but become a subset of skills in higher grades.

Wixson maintained that the framework presented by the Common Core State Standards demands connections across disciplines; “we should not allow splintering.” At the same time, Wixson warned against policies that are too prescriptive: “Keep the vision, but allow us to be responsive and adaptive in instructions and context. The goal is neither teacher-proof [instruction] nor intuitive performance.” She reminded her audience that making and implementing policy – certification, assessment, etc. – is not simple. Wixson suggested that, as a policy, Reading First has had some positive effects, but has been largely ignored by teacher educators. “As a dean, will I be able to help new faculty realize the potential of the Common Core Standards?” She said it is too early for her to have a strong read on the reaction from the field to the Common Core Standards and whether it will be compliance or adoption. Wixson indicated that accrediting bodies such as the National Council for Accreditation of Teacher Education (NCATE) and the Teacher Education Accreditation Council (TEAC) are “closer to having it right” than they have been in the past. “We need better ways to evaluate and incentivize,” said Wixson, “positive reinforcement, not punishment. We need more nuanced research, not just the number of courses and their titles, but what candidates are doing, knowledge about their cooperative teachers.”

Wixson asked rhetorically, “To what extent do teacher educators ‘do in’ a common core?” She suggested that teacher educators are closer to the Common Core Standards than they were to the five key components identified by the National Reading Panel, which may explain the AIR study finding of more evidence of the big five reading components in field experiences than in coursework. Wixson said, “This shift is profound: pick a few things and do them well. Are teachers prepared to provide coherent knowledge? To explain the role of evidence within the text?” It may be that teacher preparation “moved too far – too much process, not enough content.”

Wixson went on to describe four stages of mastery to which teachers should aspire and to which they might be held accountable: 1) knowledge of the research base; 2) integrating that knowledge into instruction, measured using an observational protocol; 3) demonstrating growth in students; and 4) demonstrating innovation as trainers of teachers. These stages could be monitored in districts and states over time, with the goal of seeing all teachers at stages 3 and 4. Wixson argued that the challenge is to get beyond academic knowledge to get to applied knowledge, contextualized knowledge. “To get at classroom practice is very difficult. Areas get very blurred and factor analyses don’t work as well.”

In response to a question about whether there are teacher education programs that have embraced the Common Core Standards or doing work with them, Wixson indicated that the University of Michigan is using them and including them in assessments; she said they are “working them in,” but not revising the program yet. In Minnesota, efforts to incorporate progressive standards took several years and much professional development.

Other comments identified one challenge as the great variation among teacher preparation programs. Ongoing research asks teachers how well prepared they think they are in teaching various topics – do you teach this now? Should you? Are you prepared to teach it? Wixson indicated that researchers are currently studying these questions in 40 states, asking questions at the district and teacher levels.

Presentations on the policy implications of developing disciplinary literacy

The next panel included two presentations on developing disciplinary literacy – challenges and questions for teacher education policy. The first was from Cynthia Shanahan, professor of literacy, language and culture at the University of Illinois at Chicago, where she also serves as executive director of the council on teacher education and associate dean for academic affairs. Shanahan began by recounting the reaction of faculty at the University of Illinois-Chicago to the suggestion that “every teacher [is] a teacher of reading.” It was, she said, a resounding NO before professional development – after which the faculty agreed to a content area class. One course. Shanahan suggested that “The same thing happens in [K-12] professional development: teachers from different areas get professional development from a literacy expert. Does that work? Shouldn’t that work?” Shanahan offered several explanations for the resistance of content area teachers to the notion of teaching reading, such as teachers feeling they would have to add to their existing curriculum, or that the professional development they may have received did not cover their specific content, suggesting that transfer is hard. As a result, content area literacy suffers from a lack of intensity of instruction, occurring perhaps as little as a single day. These reactions prompt the question, should content area teachers teach reading?

To answer this question, Shanahan described four dimensions of literacy instruction and the appropriate role of content area teachers. The first two dimensions, basic reading and interventions for remedial students, are not for content area teachers. Basic reading is done by grades 3-4; interventions are done through pull out programs. The third dimension, content area reading, may be appropriate for content area teachers if it makes sense. Shanahan argued that the real role for content area teachers in literacy instruction is the fourth dimension: disciplinary reading. Disciplines, she said, have their own ways of creating and evaluating knowledge that require special skills. Shanahan then described the results of a study investigating what it meant to read in each of three disciplines: chemistry, history and mathematics. She drew a distinction between content area reading and disciplinary reading. Content area reading focuses on learning from the text, how to study books and how to use literacy tools. Disciplinary reading, on the other hand, focuses on specialized problems in the subject area. Shanahan noted that “these are cultural differences.” The goal of reading in mathematics, she said, is “arriving at Truth.” Mathematics therefore requires close reading of every word, and rereading is a major strategy. The emphasis in mathematics reading is on error detection; therefore precision

of understanding is essential. The goal of reading in chemistry, on the other hand, is to understand process and to be able to predict what will happen under a given set of conditions. Important reading skills include comparing text with diagrams and being able to explain using different forms. Reading in history emphasizes plausibility and the understanding of perspective and corroboration.

In terms of policy implications, Shanahan argued that content teachers should teach disciplinary literacy. They are best qualified to do so, although they are often under-qualified because literacy is implicit in the discipline. This means, in turn, that having better content area teachers will require professional development and better teacher preparation. Shanahan suggested that the teacher preparation curriculum for content area candidates needs to be rewritten to include literacy instruction. Shanahan said the Common Core Standards should help in these efforts.

Shanahan was followed by Douglas Hartman, professor of literacy and technology at Michigan State University. Hartman said his focus would be on preparing secondary teachers for a changing world, and he began by observing the noticeable absence of attention to the technologies in the literacy activities. By technologies Hartman explained he meant the tools and instruments of communication – paper, pencil, dry erase pens, and the e-book. Hartman asked his audience, “What would disciplinary literacy mean if we accounted for technology? What are we preparing students for?” He answered, “a changing world,” and went on to explain how the tools of literacy are changing. For example, Twurdy.com is a search engine that estimates the difficulty level of the text contained in a search result so that readers can make better choices about which search results to pursue. The web site Great Summary (www.greatsummary.com) uses algorithms to summarize text or even an URL pasted into a text box to help readers understand difficult content.

According to Hartman, purpose and audiences are changing, strategies and skills are changing, and habits and dispositions are changing. Students are reading more online than offline. Digital books are outselling paper books on Amazon.com. Reciprocal teaching is becoming on-line reciprocal teaching. Definitions and standards are changing. Hartman argued that literacies and technologies have always been changing – the scroll was a huge technological advance. Pedagogies and assessments are changing, too.

In the context of so much change, Hartman asked, what should be given priority? His response: Mindsets, Practices and Knowledges. Hartman defined mindsets as habits of mind, preferences, worldview and prefigurative schema. He referred to Carol Dweck’s work on growth mindsets, the disposition that learning is cultivated through effort and persistence, and to an open mindset that is adaptive and versatile. He described new teacher practices that contextualize, situate, conditionalize, embed and personalize

learning for students. For example, the positioning of multiple texts can create the personalization of learning for students; tailoring textual resources to individual students can help them develop critical evaluation skills. The kinds of knowledges teachers need include content, pedagogical, technological, developmental and linguistic knowledge. Hartman said teachers need “a deep and flexible knowledge of the spectrum of technologies” available to help students gain literacy and knowledge in a content area.

Hartman closed by asking and answering this question: “If knowledge in fields of discipline is implicit, why would we want to be explicit in teaching?” While it seems to be the case that students who enter the disciplines are “good from the get-go” in terms of disciplinary literacy, “all students need some facility in these disciplines.”

Presentations and Discussions of Related Issues

Day 2 of the event began with a presentation by Kate Walsh, president of the National Council on Teacher Quality (NCTQ), on the issue of the proper balance between mathematics and pedagogy in teacher preparation programs. She described the results of *No Common Denominators: The Preparation of Elementary Teachers in Mathematics by America's Education Schools*, the 2008 study by NCTQ of 77 teacher preparation programs in 50 states. The answer to the study’s basic question, What do elementary teachers need to know about mathematics and teaching mathematics?, is “More of everything.” Walsh said this means more conceptual understanding, more pedagogical understanding, more coordination of content and pedagogy, and much more practice for pre-service candidates. Content, however, is the sorest need. Walsh said there is little research on what elementary teachers must have to be successful, although many organizations have weighed in, including states, the National Mathematics Advisory Panel, the National Council of Teachers of Mathematics (NCTM), the Conference Board of the Mathematical Sciences, the National Academies, the National Council for Accreditation of Teacher Education (NCATE) and the Teacher Education Accreditation Council (TEAC) and the National Council on Teacher Quality.

Overall, Walsh said, there is little consensus or even explicit guidance over the amount of coursework future elementary teachers should have in mathematics, the division of topics within those courses, the amount of methods coursework, or on the need for practice. NCTQ recommends that pre-service teachers receive 40 hours of instruction in numbers and operations, 30 hours in algebra, 35 hours in geometry, and 10 hours in data analysis and probability. Walsh reported that their study has found that algebra gets short shrift in current programs, with an average of 4 hours of coverage. Only half of all programs deliver even 3 credit hours in methods.

Then, Walsh said, there is the need for practice – something other groups do not raise as an issue. “We must make the transmittal of mathematics content central to

practice teaching.” Walsh pointed out that many university courses are not focused on elementary mathematics. Most programs in the NCTQ study require 2 courses in elementary math. Methods courses often combine subjects, such as mathematics and science, or grade levels, elementary and secondary. Walsh displayed a graphic showing that within the state of Texas there are 6 models of mathematics preparation. She noted that Texas has strong reading standards, but is very lax in enforcement due to claims of academic freedom. When it comes to the coordination of content knowledge and pedagogy, the NCTQ believed that only 2 of 77 programs taught content and methods concurrently; only 6 programs “allude to the practice of content.”

Walsh concluded her presentation by pointing out that NCATE and TEAC, now in the process of merging into CAEP (the Council for the Accreditation of Educator Preparation), both call for more clinical experience, but promote almost no standards for student teaching. The Interstate Teacher Assessment and Support Consortium (InTASC) has been revised but is very vague because it has chosen not to be content-specific. Performance assessment has potential, Walsh said, but Praxis 3 has a 99 percent pass rate and is based on only a single observation. Measures of value added by institutions are coming, but more slowly than hoped for.

In response to questions, Walsh indicated that the mathematics study used stratified sampling with random selection of institutions within each state with the goal of the sample mirroring the institutions in the state. The researchers made the decision not to look at who was teaching the course and instead based their data on syllabus content. Walsh said she was skeptical about states playing a strong role in improving the number of courses programs require because of issues of university autonomy and because “states do not know what they should require.” Minnesota and Massachusetts have chosen a separate route and offer a test of potential policy. She said it was hard to compare the results of the NCTQ study to those of TEDS-M because it is hard to distinguish mathematics content, “school math,” mathematics pedagogy and general pedagogy, but that the results seem to be “in the ballpark.”

When asked if she thought the Common Core State Standards (CCSS) will impact mathematics preparation, Walsh responded that the number of courses is not the issue – it’s the coverage of topics. The CCSS offer a rhetorical push to raise standards. Asked what insights on selective versus non-selective institutions come from her study, Walsh replied that they found no correlation. Walsh said that proper preparation offers real challenges to alternative route programs. She said she is nervous about “5th year states” that assume candidates come with sufficient content background, and pointed out that so few are mathematics majors in California, for example.

Walsh was followed by Eugenia Kemble, executive director of the Albert Shanker Institute. Kemble began by acknowledging her union background to her audience. Her comments were framed to respond to the question of whether and how the Common Core State Standards (CCSS) will be useful to teachers. Using an anecdote about the reality of a DC high school teacher, Kemble argued that, right now, despite their great potential, the CCSS are not likely to be very helpful until teachers understand the expectations they set and have the curricula and materials to implement them. Most teachers, Kemble said, do not know what the CCSS are – their systems are facing layoffs and they are preoccupied with the consequences. Kemble portrayed the introduction of the CCSS as an opportunity for change but said their implementation is problematic. They are “up against lots of variation in contexts and practices. No wonder we have so little knowledge about what we’re doing.” She said that textbooks vary just as much. According to Kemble, “Other nations collect data, analyze it and create policy; we collect data, complain, then do what we want.” She said that as a nation “we embrace this diversity,” and contended that counterproductive “variability is defended by extremists at both ends.” Kemble reminded her audience that “Goals 2000 set great goals, but little reached the classrooms.” She predicted that, if the CCSS are implemented properly, teachers will be able to see where their work fits into a student’s progression, and that, “when expectations are clear, teachers – and ed schools – will have to face their weaknesses” and make necessary improvements. Kemble said she believed that schools of education will then use the CCSS to design programs to meet them. Kemble referred to a National Academy of Sciences report on tests, test-based incentive systems and test-based accountability. She argued that increased effort on the part of schools and their staffs to increase student achievement scores may result in test score increases, but more teachers may also quit. Many may be willing to target their increased effort on test score effects, but others will not want to teach to such narrow goals. Kemble asserted that teachers have been left out of discussions that shape these policies.

So, what are the prospects of the CCSS making a difference, given higher education’s reluctance to change? Education schools will have to face the fact that if districts are going to be held accountable, said Kemble, they will start to share that accountability with teacher preparation institutions and try to find ways to hold them accountable too. Programs are likely to rise or fall depending on how well their graduates deliver on the standards.

Kemble clarified that there is no one way to deliver a curriculum, and so no single curriculum for teacher preparation. She said that the current movement reminds her of the 1980s, in that “this movement puts teaching and teacher education back in the center of progress. This is a renaissance.” Kemble said she was reminded of Harold Stevenson and James Stigler’s description of lesson study in Japan and the concept of improving teaching

by “polishing the stone,” a professional development practice in which teachers systematically perfect lessons by sharing best practice.

The challenges to standards-based reform and the continuous improvement of teaching practice that this undertaking will require, said Kemble, are that “teachers are circling the wagons right now; they feel threatened.” They are afraid of being unfairly evaluated, of being laid off, of being blamed for all the learning problems many students have that have nothing to do with teaching. “A cultural, political change is necessary,” she said. Kemble went on to point to signs of such change, including the population of teachers: about half of new teachers were undergraduate education majors, said Kemble, and one third are from alternate route programs. As a result, there are “very different attitudes coming out of preparation programs,” including the notion in the U.S. that “teaching is not and need not be a long-term profession.” This latter view is wrong-headed, she said.

Presentations on challenges facing schools and colleges of education:

Extinction vs. reform

The final presentations were from Sigrid Blömeke, professor of institutional research at Humboldt University, Berlin, and Jane Hannaway, senior fellow and founding director of the Education Policy Center at the Urban Institute and director of CALDER (National Center for the Analysis of Longitudinal Data in Education Research). Blömeke titled her presentation, “Longing for Schools of Education: Teacher Education in Germany.” There are no schools of education in Germany; in her comments, Blömeke explained why Germany wants them, and what the problems are. She began with the latter: What’s not working? Blömeke cited problems such as fragmentation across and within institutions, as well as “a huge gap between theory and practice.” She said schools complain that new teachers have lots of content knowledge but can’t bring things together. Without schools of education, said Blömeke, there are “no real advocates for teacher education in Germany – merely arguments from disciplinary circles.” She reported that teachers are recognized and portrayed as weak students with not enough depth.

Blömeke argued that “you can’t leave mathematics preparation to mathematicians because they don’t care about making the connections.” She also pointed out a lack of education research because there are no colleges of education. Blömeke reviewed the historical roots of teacher preparation in Germany, beginning in 1810 with university-based teacher education focused on classical subjects. In 1890 practical experience was added, but it was on-the-job training not connected to a teacher’s university experience. Elementary preparation programs only came into being in the 1960s and 1970s, and there exists a junior/senior civil service distinction between elementary and secondary teachers. In Germany, said Blömeke, all teachers are trained in multiple subjects – two for secondary teachers, three for elementary teachers. Teacher preparation includes 3.5 to 4.5 years of university study and 1.5 – 2.0 years of “practical study.” There is a strong, high-stakes

professional entrance examination run by the state that includes written and oral components, including a thesis.

Blömeke went on to make the case for schools of education in Germany. She described two perspectives. The first is that of teacher educators and the teaching profession, who see in schools of education a home for teacher education, advocacy for its concerns and more efficient models of teacher preparation. Blömeke pointed out that “Germany makes a much longer investment in teacher preparation, but with ‘only U.S.’ outcomes.” Initial attempts to create schools of education began in the 1990s with the coordination of offices and the double affiliation of faculty in university departments, but with no authority to require or dictate programs of study.

The second perspective Blömeke presented is that of university leaders and deans. Blömeke reported that the quality of universities in Germany has been historically very even. Now a governmental initiative is underway with new funding for “excellence for universities” based on an Ivy League model. This initiative includes schools of education as a special feature of these new best universities. Part of the rationale is to create a feeder cycle to train better teachers in order to get better students into the university; there is also a growing recognition of education as a social responsibility. Since 2008, schools of education in these universities have been organized as separate departments: courses with 50 percent or more education students are shifted into the school of education, gaining access to greater funding sources.

Blömeke said that both perspectives have common objectives, including sharpening education research, recruiting better graduates into masters programs, supporting young researchers, and seeking more coordination in the preparation of teachers. “What’s so normal for the U.S. is so new for Germany,” concluded Blömeke. “There is no magic bullet how to organize teacher education.”

Jane Hannaway began her comments by situating herself “in a policy world, not an education school or disciplinary world.” She described the key purposes of schools of education as the selection, training, and preparation of candidates for official certification. At the same time, she said, ours has been a decentralized system, controlled by individual states, by schools within states, and by the non-selective nature of student entry. Grounding her comments in the discipline of sociology generally and institutional theory in particular, Hannaway asserted that the technical tasks of teacher preparation predict its organizational structure and management. Schools of education have had weak control over the technical tasks, with little direct inspection of instruction and little control over their output. At the same time, they have had strong control over the ritual classifications represented by teacher certification. Teacher preparation has lacked clarity about its means, ends and understandings, the measures of its outputs, or agreements over its goals.

From an institutional theory perspective, the historical structure of teacher preparation has kept the system stable and reduced conflict.

"The game changer," said Hannaway, "is information." The advent of new state data systems, including outcome measures, census files, the longitudinal capacity to measure student gains and to link student and teacher data, allow researchers and policy makers to attribute student gains to individual teachers. Several important findings have become clear. One is that teachers are the most important school factor in student achievement. Another is that there is large variation among teachers: top teachers help students gain one and a half years of growth each year, while the students of bottom teachers gain only half a year of achievement over the course of the year. This variation is not associated with teacher compensation, experience or degree attainment. Hannaway presented data showing that variation in teacher "value added" accounts for a six percentile difference in student ranking between the top quartile of students in New York City and their bottom quartile peer, and said that estimates from students in the Los Angeles city schools are even larger. She also showed data indicating that this performance persists over years.

Hannaway then turned to the competition that education schools now face, such as from Teach for America, the New Teachers Project and Teacher U at Hunter College – all of which, Hannaway noted, provide selective entry into the profession. She described this as "the importance of the pipeline," with recruitment and selection as the first stage of the continuum. Research on these competitors suggests that TFA-trained teachers have an advantage over other teachers, and Hannaway indicated that "these are the sorts of findings that circulate among federal policy makers." Hannaway said that all of this suggests a new role for schools of education, that of taking control over a key input of student achievement: teacher candidate pools. There is a tremendous need for research, she said, with huge variations to be explained. Which characteristics of teachers matter? Are schools of education recruiting and selecting candidates for effectiveness? Do education school candidates have the same SATs as TFA candidates? Hannaway noted that vocabulary skills predict better teachers, and that TFA keeps close data on its candidates. She asked, "How do we train for effectiveness versus compliance? How do we verify on-the-job performance?" Hannaway referred to "the magic and mystery of great teaching," something much more complex than organizing materials; it is a "complex mix of personality, subject matter knowledge, pedagogy for subject matter and classroom management." Hannaway described good teaching as performance, including knowing your audience. "Empathy may be another part of teaching," she said.

Hannaway suggested that "the validity of ed schools was unquestioned" until the data became available. "Ed schools have been repeatedly criticized over the decades, but mostly through anecdotal data," she said. Although it is hard to tease out variation in programs when states set some of the governing parameters, Hannaway insisted that "the

underlying issue is that the distribution variability is still there.” A further complication is that “we mistake colleges of education for teacher preparation; these institutions grant degrees, but 40 percent of their graduates do not go into teaching, and 21 percent of new teachers have no undergraduate preparation in education.” More and more, she said, colleges of education grant masters degrees. Hannaway also questioned whether the unit of analysis should be the school of education or the university, noting that preparation takes place in the university context. Hannaway concluded by reminding her audience that teacher education is organized very differently across the U.S. The questions before us, she said, are: what should the change be, and how to effect it?

The discussion following these presentations included speculation about whether education could “reap the productivity rewards of technology” by combining “great teachers at a distance” with good, competent coaching on-site. Another role of schools of education would be to figure out how to make this happen. It was also suggested that the traditional role of schools of education would still be relevant if more of them were doing their jobs; “the degree of brokenness skews the impact data,” meaning it is very possible for some education schools to do a great job, but they are drowned out by the rest. If we can identify them, can we scale them up? Will districts choose them or prefer home grown products? New Jersey’s alternative route was based on this premise of “home grown;” some districts there now have collaborative deals with schools of education. Teaching is a geographically local labor market. Research on these arrangements is now underway with funding from multiple states through CALDER; the results will have potential implications for who gets to have teacher preparation and who gets to be a teacher.

Final thoughts

Education Policy Center co-director Robert Floden concluded the sessions by thanking all the presenters and attendees. He remarked upon the appropriateness of the timing of the meeting, given the availability of new data, the recent release of the Common Core State Standards and the development of education policy at the federal level. He noted that only recently have studies emerged such as TEDS-M and the AIR studies that could give a nationally representative picture of teacher preparation in the U.S., and suggested that more knowledge about teacher preparation might motivate change in both policy and practice in teacher education. Floden said he was struck by the contrast between the reactions to the reports concerning mathematics and literacy. People seemed quick to dismiss the literacy study in particular because of its methodology; critics have not had the same opportunity for TEDS-M. He acknowledged the difficulty of measuring outcomes in literacy; content knowledge and pedagogy are easier to measure in mathematics. Floden wondered whether we should monitor change in teacher education over time, perhaps through a research study similar to NAEP – a low stakes endeavor to

provide an accurate picture. "As a community," Floden urged, "we need to keep working on assessments and data."

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